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ABSTRACT

An outdoor education program for migrant children was compared with a typical school program during the summer of 1969. The Wide Range Achievement Test was administered to both groups to obtain a pretest and posttest measure of reading and arithmetic. Visual-motor development was measured by the Bender-Gestalt scored by the Koppitz Developmental Scoring Method. A special measure of attitude toward the programs was also used. Each program enrolled about 65 children. Because of attrition and statistical requirements, population analyses were based on a sample of 26 from each program for a total of 52 subjects. Results were based on analysis of covariance applied to the posttest data with control for corresponding pretest information. Children in the typical indoor summer school program improved more in visual-motor development and arithmetic. No significant differences not accounted for by pretest differences were noted for attitudinal and reading modification. (Author)

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RESPONSE OF MIGRANT CHILDREN TO OUTDOOR EDUCATION

by

Thomas L. Hick

Fall 1970

STATE UNIVERSITY COLLEGE OF ARTS AND SCIENCE
Geneseo, New York
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THE NEW YORK STATE CENTER FOR MIGRANT STUDIES

The New York State Center for Migrant Studies is an independent organization devoted to professional research in the areas of education, employment, community relations and other aspects of the conditions of migrant labor in the State of New York.

The principal purposes are to initiate studies relevant to understanding and improving the conditions of the migrant, and to publish and disseminate these studies. The New York State Center for Migrant Studies, co-sponsored by the New York State Education Department's Bureau of Migrant Education, John Dunn, Chief, and the State University College of Arts and Science at Geneseo, New York, Robert W. MacVittie, President, was founded in February 1968.

This study has been recommended for publication by the Publications Committee of the Executive Council of the Center as an important contribution to the understanding of the migrant problem. It has been approved by the Executive Council of the Advisory Board of the Center except as specifically indicated and supercedes all previous drafts released for private circulation prior to publication. However, the interpretations and conclusions of the study are those of the author and do not necessarily represent the official position of the Center.

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A B S T R A C T

RESPONSE OF MIGRANT CHILDREN TO OUTDOOR EDUCATION

An outdoor education program for migrant children was compared with a typical school program during the summer of 1969. The Wide Range Achievement Test was administered to both groups to obtain a pre and posttest measure of reading and arithmetic. Visual-motor development was measured by the Bender-Gestalt scored by the Koppitz Developmental Scoring Method. A special measure of attitude toward the programs was also used. Each program enrolled about 65 children. Because of attrition and statistical requirements, population analyses are based on a sample of 26 from each program for a total of 52 subjects. Results are based on analysis of covariance applied to the posttest data with control for corresponding pretest information. Children in the typical indoor summer school program improved more in visual-motor development and arithmetic. No significant differences not accounted for by pretest differences were noted for attitudinal and reading modification.

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OBJECTIVE

The objective of this study was to study the effect of outdoor education on the academic skills, perceptual-motor development and attitudes of children from the migrant community.

Also of interest was determining the degree to which achievement and attitude could be statistically predicted from data compiled from the test instruments employed.

GENERAL PROCEDURE

Since the objectives implied a comparative study, pretest and posttest data were obtained for a program operated under an outdoor education philosophy as well as a program operated from a regular summer school approach (indoor). An attitude scale was written and given along with the individually administered Bender before and after each program. Wide Range Achievement Tests were administered as a regular part of both programs. Reading and arithmetic grade equivalents were gathered at the end of the summer. Indoor and outdoor programs were then compared using analysis of covariance to control for initial differences.

The indoor program can best be described as a typical, traditional summer school program. Children were formally taught in the classroom setting with the conventional teacher-to-student ratio. These children were bussed to and from the summer school daily.

The outdoor program was based upon an educational philosophy of learning by doing. More indirect approaches to education were employed. For example, reading would be learned through having to cope with reading the directions for building a rocket. Arithmetic would be handled through an indirect problem solving approach like mapping the camp area. This would necessitate measuring, adding, graphing, etc. The children in this program were bussed to the school camp at the beginning of the week, slept over until the end of the week, and then were bussed back.

SUBJECTS

Indoor education or the traditional summer school was represented by a program (1969) at Warwick, N.Y. Outdoor education was represented by a program (1969) at the Ashokan Campus of the State University College at New Paltz, N.Y.

After attrition and missing data took its toll, complete sets of data for 26 children from the outdoor program had been collected. Although 38 complete sets of data were available from the indoor program a randomly selected group of 26 subjects was used in the covariance analyses.

Children in the outdoor program had a mean chronological age of 9.4 years, (S.D. 2.2) while those in the indoor program had a mean chronological age of 8.9 (S.D. 2.0). This difference in age is not statistically significant. Both programs appeared to have an even distribution of boys and girls. The indoor program was attended by predominantly bi-lingual Spanish-Americans while the children in the outdoor program were predominantly Blacks.

MEASURES

Data were obtained from the Wide Range Achievement Test in reading and arithmetic. In addition, the Bender-Gestalt test was administered and scored by the Koppitz method. This method produces scores related to age and is considered to be a measure of general school readiness (treated in this fashion the scores correlate with the Metropolitan Readiness Tests) and visual-motor development. For this purpose, the Bender was included in the list of measures. During the posttest, total time taken to complete the Bender was also recorded as an experimental variable.

A special scale of attitude toward the program was constructed for this study. It consisted of a set of eight questions. A sample of this scale is included in Appendix I.

RESULTS

A variety of statistical tests were performed to study a variety of effects. Differences between programs were the objective of this study and are discussed here as well as in the next section (CONTROLLED COMPARISONS). In a later section (CORRELATIONAL RESULTS) relationships between the variables are described.

SIMPLE COMPARISONS

Direct differences between programs are given in Table 1. Significance was determined by use of the t-test statistic. Table 1 must be interpreted with extreme caution as covariance results refute some generalizations reported in it.

TABLE 1*

Results of testing the significance of the difference between the means employing the t-test for indoor (n=38) and outdoor (n=26) programs on all measures for subjects having complete data.

	MEASURE	MEAN		STANDARD DEVIATION		SIGNIFICANCE TEST
		IN.	OUT.	IN.	OUT.	
1.	Age (years)	8.92	9.45	2.04	2.18	N.S.
2.	Pretest Reading (G.E.)	2.10	3.34	1.92	2.15	.05
3.	Pretest Arithmetic (G.E.)	2.44	2.87	1.81	1.71	N.S.
4.	Posttest Reading (G.E.)	2.30	3.21	1.88	2.21	N.S.
5.	Posttest Arithmetic (G.E.)	2.79	2.90	2.02	2.02	N.S.
6.	Pretest Attitude (R.S.)	5.50	6.73	1.11	0.81	.001
7.	Pretest Bender (R.S.)	8.74	5.23	4.53	4.06	.005
	Developmental Age	5.75	7.00			
8.	Posttest Bender (R.S.)	7.45	6.88	4.96	4.97	N.S.
	Developmental Age	6.40	6.60			
9.	Posttest Response Time to Bender (Min)	6.13	7.32	1.69	2.20	.05
10.	Posttest Attitude (R.S.)	5.84	6.77	0.99	0.97	.001

* Exercise caution in interpretation for program effects. See covariance tables 2-5.

Children in the two programs did not differ significantly in age or arithmetic ability at the outset of the study. Outdoor children were found to be better readers, better in terms of perceptual development and they had a better attitude toward the program.

At the end of the summer, the outdoor children no longer appeared to have an advantage in reading or perceptual development. The programs still did not differ in arithmetic. Children in the outdoor program, however, did maintain the more favorable attitude. By way of added information they spent more time drawing the Bender designs.

Some characteristics of the children can also be drawn from Table 1. The average age during the experiment was 9.18 years. Comparison with standardized norms for these tests show that the average achievement is about one year below expectation. Judging from the means and standard deviations, about 69% achieve below their age level (grade level). At the same time, their perceptual development is about 2.5 years below their age expectancy.

No general pretest to posttest improvement on any factor was observed to be statistically significant, although posttest means were higher than pretest means.

CONTROLLED COMPARISONS

The controlled comparisons offered here refute the superficially apparent effects of the programs shown in Table 1. These analyses offer a more realistic view of program effects on achievement, perception, and attitude.

Attitudes were similarly unaffected by both programs as shown in Table 2.

TABLE 2

Analysis of covariance results for posttest attitude with control for differences in pretest attitude

Analysis of Covariance Table

SOURCE	DF	RESIDUAL SUMS OF SQUARES	MEAN SQUARES	F RATIO
Between Programs	1	1.577	1.577	2.44*
Within Programs	49	31.670	0.646	
Total	50	33.250		

Table of Means and Standard Deviations

	PRETEST ATTITUDE		POSTTEST ATTITUDE		ADJUSTED POSTTEST ATTITUDE	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	MEAN	
Indoor	5.7	1.1	6.0	0.8	6.2	*
Outdoor	6.7	0.8	6.8	1.0	6.6	

* Difference not significant

Together with Table 1, these results indicate that the outdoor program attracted the more favorable attitude but neither program significantly changed attitude. The posttest difference in favor of the outdoor program is partially explained by the initial attitude of the two groups.

Program effects on arithmetic are given in Table 3. Arithmetic was improved more by the indoor program. Although Table 1 shows the two programs not differing in either pretest or posttest for arithmetic, this analysis of covariance shows that the change in arithmetic was .4 of a grade equivalent greater for the indoor program with the indicated significance level.

TABLE 3

Analysis of covariance results for posttest arithmetic with control for differences in pretest arithmetic

Analysis of Covariance Table

SOURCE	DF	RESIDUAL SUMS OF SQUARES	MEAN SQUARES	F RATIO
Between Programs	1	178.3	178.3	4.8*
Within Programs	49	1800.0	36.7	
Total	50	1978.0		

Table of Means and Standard Deviations

	PRETEST ARITHMETIC		POSTTEST ARITHMETIC		ADJUSTED POSTTEST ARITHMETIC	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	MEAN	
Indoor	2.7	2.1	3.1	2.3	3.2	*
Outdoor	2.9	1.7	2.9	1.8	2.8	

* Significant beyond the .05 level

Program effects were also significant for Bender scores (Table 4).

TABLE 4

Analysis of covariance results for posttest Bender scores with control for differences in pretest Bender scores

Analysis of Covariance Table

SOURCE	DF	RESIDUAL SUMS OF SQUARES	MEAN SQUARES	F RATIO
Between Programs	1	71.4	71.4	10.5*
Within Programs	49	332.8	6.8	
Total	50	404.3		

TABLE 4 (Cont.)

Table of Means and Standard Deviations

	PRETEST BENDER		POSTTEST BENDER		ADJUSTED POSTTEST BENDER	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	MEAN	
Indoor	7.8	4.5	6.9	4.9	5.7	*
Outdoor	5.2	4.1	6.9	5.1	8.1	*

* Significant beyond the .005 level

Bender scores here refer to scores resulting from the use of Koppitz scoring method which measures development of visual perception. Higher scores reflect poorer development. Here we see that the visual perception of the children in the indoor program improved while children in the outdoor program regressed. The net difference is change in favor of the indoor program.

Program effects on reading were found to possess no statistical significance (Table 5).

TABLE 5

Analysis of covariance results for posttest reading with control for differences in pretest reading

Analysis of Covariance Table

SOURCE	DF	RESIDUAL SUMS OF SQUARES	MEAN SQUARE	F RATIO
Between Programs	1	143.8	143.8	2.6*
Within Programs	49	2691.0	54.9	
Total	50	2834.0		

Table of Means and Standard Deviation

	PRETEST READING		POSTTEST READING		ADJUSTED POSTTEST READING	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	MEAN	
Indoor	2.3	2.1	2.6	2.1	3.1	*
Outdoor	3.3	2.2	3.2	2.2	2.7	*

* Difference not significant

Outdoor children were initially better than indoor children in reading but this difference did not exist at the end of the programs. Table 5 indicates that the change in reading was essentially the same in both programs.

DESCRIPTIVE RESULTS

Having the same measures available from two independent samples made it possible to develop posttest predicting equations on one sample and then apply them to the other.

Table 6 gives the correlational and other related data upon which multiple linear regression was run. Resulting prediction equations are shown in Table 7. It may be seen upon examination of the R column in Table 7, that the pretests correlated best with reading and least with time spent to copy the Bender designs (Bender Time). It may also be seen that while reading is best predicted by a weighted combination of reading (.65) and arithmetic (.39), arithmetic may be predicted only by pretest arithmetic. Curiously, age had nothing to do with posttest achievement when pretest measures of achievement are available. Bender scores and attitude seem to be primarily determined by their corresponding pretests.

TABLE 6

Means, Standard Deviations and Correlation Matrix * - Indoor Program

	AGE	PRETEST READ	PRETEST ARITH	POSTTEST READ	POSTTEST ARITH	PRETEST ATT	PRETEST BDR	POSTTEST BDR	POSTTEST TME	POSTTEST ATT
1. Age	1.00	.77	.81	.78	.77	.01	-.62	-.56	-.06	.21
2. Pretest Reading	.77	1.00	.89	.94	.84	.23	-.69	-.65	-.11	.26
3. Pretest Arithmetic	.81	.89	1.00	.91	.95	.32	-.69	-.67	.01	.28
4. Posttest Reading	.78	.94	.91	1.00	.91	.22	-.65	-.62	-.06	.25
5. Posttest Arithmetic	.77	.84	.95	.91	1.00	.20	-.70	-.69	.03	.19
6. Pretest Attitude	.01	.23	.32	.22	.20	1.00	-.11	-.20	-.04	.43
7. Pretest Bender	-.62	-.69	-.69	-.65	-.70	-.11	1.00	.84	-.02	-.24
8. Posttest Bender	-.56	-.65	-.67	-.62	-.69	-.20	.84	1.00	-.04	-.33
9. Posttest Time	-.06	-.11	.01	-.06	.03	-.04	-.02	-.04	1.00	-.08
10. Posttest Attitude	.21	.26	.28	.25	.19	.43	-.24	-.33	-.08	1.00
Mean	8.9	2.1	2.4	2.3	2.8	5.5	8.7	7.4	6.1	5.8
Standard Deviation	2.1	1.9	1.8	1.9	2.0	1.1	4.6	5.0	1.7	1.0

* Decimal points removed

TABLE 7

Prediction Equations from Indoor Program Data

	CRITERION (POSTTEST)	STANDARDIZED BETA WEIGHTS (FOR PRETESTS)					
		R	AGE	READ	ARITH	BDR	ATT
4.	Reading	.96	-.02	+.65	+.39	+.06	-.05
5.	Arithmetic	.96	-.08	-.10	+1.10	-.10	-.13
8.	Bender	.86	+.06	-.03	-.16	+.74	-.06
9.	Bender Time	.31	-.23	-.62	+.72	-.11	-.14
10.	Attitude	.49	+.25	+.07	-.22	-.14	+.47

		B WEIGHTS FOR OBTAINED DATA					CONSTANTS
4.	Reading	.01	.64	.41	.23	-.82	2.27
5.	Arithmetic	-.08	-.11	1.20	-.43	-2.30	22.52
8.	Bender	.01	-.01	-.05	.91	-.26	2.89
9.	Bender Time	-.19	-.55	.67	-.40	-2.11	85.82
10.	Attitude	.01	.00	-.01	-.03	.41	3.14

Table 8 illustrates predicted and actual scores for each child in the indoor sample. The correspondence is close as might be expected when prediction equations are applied to the very data upon which they were developed.

TABLE 8

Actual and Predicted Posttest Data From Indoor Program

ACTUAL					PREDICTED				
READ	ARITH	BENDER	BENDER TIME	ATTITUDE	READ	ARITH	BENDER	BENDER TIME	ATTITUDE
43	42	5	65	7	44.3	43.8	7.1	56	6.4
73	72	3	42	6	70.3	75.0	2.0	59	6.5
43	44	6	47	7	42.0	44.5	7.8	59	6.2
11	14	15	27	6	9.27	8.9	14.0	60	5.3
39	46	4	45	6	39.3	44.4	5.5	62	5.7
67	56	8	47	6	62.2	51.8	10.1	47	5.8
34	46	5	27	5	33.5	36.6	9.2	62	5.7
75	65	1	52	6	79.4	71.5	-0.15	51	6.2
56	56	3	92	5	40.4	48.8	4.5	65	5.6
46	59	1	72	6	48.1	60.0	1.83	66	5.8
27	36	11	50	6	32.0	30.2	12.4	55	6.1
29	32	15	42	4	26.9	31.7	12.1	61	5.2
28	26	14	57	4	24.8	27.7	12.2	61	5.1
70	52	9	50	6	61.6	53.5	9.0	51	5.7
40	44	10	83	7	37.9	41.7	8.1	59	6.3
42	56	1	43	6	42.6	54.2	3.4	64	5.6
41	46	5	80	5	45.7	44.4	5.6	55	5.9
47	48	1	67	7	48.9	49.5	3.3	52	6.9
22	21	9	70	6	25.4	31.5	9.4	65	5.0
58	65	8	58	6	40.7	53.5	6.6	65	6.1
19	24	15	45	4	20.9	24.6	13.1	61	5.7
36	44	8	93	7	35.9	48.4	10.4	66	6.2
46	48	5	72	8	44.0	43.0	6.3	57	5.7
50	56	3	50	6	53.2	58.2	8.2	61	5.6
17	16	15	68	6	12.3	13.4	11.4	61	5.4
32	44	11	62	7	36.7	53.8	10.0	72	5.3
36	44	8	82	4	48.3	53.7	5.9	62	5.6
36	43	12	57	6	37.9	44.1	6.7	62	5.9
55	70	4	53	6	59.2	71.0	1.7	61	6.2
49	59	8	48	7	53.8	67.8	6.5	65	5.8
53	50	7	57	6	57.7	57.3	7.0	56	5.4
25	27	20	70	5	25.3	21.9	17.8	58	4.8
48	62	5	62	5	45.8	55.3	2.0	64	5.8
22	46	5	105	4	22.9	38.2	11.9	71	5.0
49	62	4	77	6	50.4	63.7	4.0	68	5.6
110	134	0	70	6	105.7	121.6	2.1	67	6.5
27	26	16	80	5	30.2	35.4	11.4	62	6.0
33	39	3	48	7	36.1	44.5	5.2	63	6.6

The validity of the equations is shown by the close correspondence between predicted and actual scores in Table 9. Here, the equations developed with indoor data are applied to children in the outdoor program. The correspondence is remarkably similar to the extent of agreement with indoor data.

TABLE 9

Comparison of Real Prediction of Outdoor Program Posttest Results With Equations Developed on Indoor Program Data

ACTUAL					PREDICTED				
READ	ARITH	BENDER	BENDER TIME	ATTITUDE	READ	ARITH	BENDER	BENDER TIME	ATTITUDE
58	50	3	58	7	56.3	58.2	1.1	56	6.7
30	28	9	32	7	40.9	16.2	6.4	37	6.7
88	83	4	115	7	84.0	94.1	-1.0	61	6.7
50	41	17	115	5	48.2	45.9	7.5	59	5.3
59	48	3	82	7	57.7	55.9	4.0	58	5.6
67	67	2	57	7	65.4	74.9	1.0	62	6.7
34	30	11	60	8	33.3	32.1	6.7	52	7.0
88	70	6	105	7	78.7	67.9	0.5	46	6.7
85	83	0	53	7	69.8	81.1	-1.0	60	6.9
45	41	10	92	7	37.0	36.9	4.2	56	6.5
36	30	6	65	7	32.5	28.7	5.6	54	6.1
59	44	2	50	7	47.3	52.6	1.4	53	7.4
50	50	5	72	7	48.3	55.1	3.1	63	6.0
41	50	3	68	7	43.0	53.3	1.4	62	6.6
44	59	2	52	8	45.2	60.2	3.3	65	6.9
27	29	10	65	8	31.4	29.2	8.3	52	6.3
82	81	2	77	8	76.8	66.3	-0.2	42	7.5
19	29	15	85	5	28.0	23.7	13.0	55	5.7
28	32	16	55	5	31.2	35.4	11.0	62	5.7
36	41	6	98	5	41.3	47.3	7.0	62	6.2
22	23	16	55	5	22.8	21.8	10.5	56	6.3
30	36	10	110	6	32.9	40.3	6.7	65	5.7
81	56	5	73	8	73.0	49.0	1.3	34	7.0
56	46	7	60	7	51.3	50.3	1.2	55	6.6
48	62	9	93	7	53.9	59.3	3.9	59	6.3
92	65	0	55	7	89.6	60.8	0.4	34	6.7

It seems appropriate to state that the prediction equations are valid. Since this turned out to be the case, the indoor and outdoor data were put together and the equation development repeated. Table 10 shows the combined correlation matrix.

TABLE 10

Means, Standard Deviations and Correlation Matrix * - Both Programs

		AGE	PRETEST READ	PRETEST ARITH	POSTTEST READ	POSTTEST ARITH	PRETEST ATT	PRETEST BDR	POSTTEST BDR	POSTTEST TME	POSTTEST ATT
1.	Age	100	71	80	76	76	24	-66	-61	-06	41
2.	Pretest Reading		100	81	94	78	33	-73	-63	09	41
3.	Pretest Arithmetic			100	89	95	33	-71	-69	12	34
4.	Posttest Reading				100	88	31	-73	-65	10	38
5.	Posttest Arithmetic					100	21	-69	-69	10	25
6.	Pretest Attitude						100	-35	-27	00	55
7.	Pretest Bender							100	81	-08	-49
8.	Posttest Bender								100	07	-43
9.	Posttest Time									100	-03
10.	Posttest Attitude										100
	Mean	9.1	2.6	2.6	2.7	2.8	6.0	7.3	7.2	6.6	6.2
	Standard Deviation	2.1	2.1	1.8	2.1	1.9	1.2	4.7	5.0	2.0	1.2

* Decimal points removed

Table 11 shows the best estimates of equations for predicting end of summer WRAT arithmetic and reading as well as Bender development and Bender time generated from data collected at the beginning of the summer for migrant children.

TABLE 11

Best Estimates of Equations for Predicting End of Summer WRAT Arithmetic and Reading and Bender Development and Time from Data Obtained at the Beginning of the Summer for Migrant Children

	CRITERION	R	B WEIGHTS FOR OBTAINED DATA					
			AGE	READING	ARITH	BENDER	ATTITUDE	CONSTANT
4.	Reading	.97	.02	.64	.40	.00	-.53	-.42
5.	Arithmetic	.96	.00	.03	1.00	-.20	-2.00	14.17
8.	Bender	.83	.00	.02	-.08	.72	.17	3.87
9.	Bender Time	.30	-.43	-.04	.52	-.47	-1.06	93.36
10.	Attitude	.67	.02	.01	-.02	-.07	.42	3.45

CONCLUSIONS

According to the evidence presented here, the indoor program showed a more positive trend than the outdoor program. Children in the indoor program improved more in visual-motor development and arithmetic. Any other differences that might have existed could be explained by initial differences.

It was also found that achievement in arithmetic and reading, and Bender visual-motor development could be predicted from the corresponding pretest scores.

APPENDIX I

Scale of Attitudinal Reaction to Program

1. Are the teachers here nice or not so nice as you have had before? 1 - nice.
2. Is the work (what you do) easier or harder than you have had before? 1 - easier.
3. Would you rather come here or stay home? 1 - come here.
4. Is this program (what you do here) different than regular school? How is it different? 1 - yes, different.
5. Do you have friends here (in school/camp)? 1 - yes.
6. Is (would you say that) what you do here fun? 1 - yes.
7. Are you here because you want to be or are you here because your parents make you come? 1 - want to be.
8. Do both parents work? (Which work?) 1 - parent at home.